

Claims 1 and 5 are rejected under 35 U.S.C. § 102(b) for lack of novelty as evidenced by Akira, JP 4-372133

In the first enumerated paragraph of the Office Action, the Examiner asserted that Akira discloses a semiconductor device corresponding to that claimed. This rejection is respectfully traversed.

In the Amendment filed October 29, 2002; Applicants argued:

On page three of the statement of the rejection, the Examiner asserted that reference numeral 4 of Akira discloses the claimed hard mask. Reference numeral 4, however, is used in Akira to refer to a photoresist (PR). The term "hard mask" has a very specific usage to those having ordinary skill in the art of semiconductor manufacturing, and describing a photoresist is not included as part of that specific usage. As such, Akira fails to disclose a hard mask.

The Examiner responded to these arguments in the thirteenth enumerated paragraph of the Office Action, with the following:

It is argued, at page 4 of the Remarks, that the photoresist 7 of Akira is not the hard mask, as claimed. This argument is not convincing because the photoresist of Akira is used to etch the wiring 3. So it is [sic] function as the hard mask.

The Examiner's argument is essentially that a disclosed feature (i.e., the photoresist 7 of Akira) and a claimed feature (i.e., hard mask) can be considered identical if the disclosed feature is capable of performing a function of the claimed feature. This argument is not persuasive, as the Examiner must establish that the applied reference identically discloses each feature of the claimed invention.¹ As part of this analysis, the Examiner is burdened to (a) identify the elements of the claims, (b) determine the meaning of the elements in light of the specification

¹ In re Rijckaert, 9 F.3d 1531, 28 USPQ2d 1955 (Fed. Cir. 1993); Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).

and prosecution history, and (c) identify corresponding elements disclosed in the allegedly anticipating reference.²

The mere assertion that a disclosed element is capable of performing a function of the claimed element is not enough to establish that the disclosed element identically discloses the claimed element. To reject claim 1 under 35 U.S.C. § 102, the Examiner must establish that the alleged disclosure reference identically discloses a hard mask. Instead, the Examiner merely believes that the photoresist 7 of Akira is capable of performing a function of the claimed hard mask. However, two features having an alleged share function is not enough to consider these features as being identical. Thus, significant differences exist between the semiconductor device defined in independent claim 1 and the device of Akira, as claim 1 recites a hard mask whereas Akira discloses a photoresist. Therefore, Applicants respectfully solicit the withdrawal of the rejection of claims 1 and 5 under 35 U.S.C. § 102 as evidenced by Akira.

In the statement of the rejection, the Examiner also asserted:

Note that the term "formed in a single layer" is method recitation in a device claimed, and it is non-limiting, because only the final product is relevant, not the method of making. A product by process claim is directed to the product per se, no matter how actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

The Examiner's analysis appears to be based on the mistaken belief that "product-by-process" limitations can be completely ignored in product claims. Upon reviewing M.P.E.P. § 2113 and the case law cited therein, Applicants submit that the Examiner has misapplied the established case law with regard to product-by-process limitations. A product-by-process limitation

² Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick Co., supra

must be considered by the Examiner in making a determination of novelty or obviousness.

Although the Examiner has a reduced burden of proof with regard to product-by-process claims, as discussed in M.P.E.P. § 2113, the Examiner must first provide a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art.³ However, even if the Examiner makes such a reasoned argument, Applicants have an opportunity to provide evidence that establishes a difference between the product of the prior art and the claimed product. Therefore, in evaluating the claims, the Examiner must establish that the applied prior art teaches or suggests the claimed feature of "said thick film wiring and said thin film wiring being formed in a single layer."

Furthermore, Applicants submit that "formed in a single layer" is a structural limitation. This limitation requires a single layer be present and excludes multiple layers. Therefore, the Examiner's assertion that this limitation is a "product-by-process" limitation is moot.

Claims 1 and 5 are rejected under 35 U.S.C. § 102(b) for lack of novelty as evidenced by Yoshihiko, JP 2-264432

In the second enumerated paragraph of the Office Action, the Examiner asserted that Yoshihiko discloses a semiconductor device corresponding to that claimed. This rejection is respectfully traversed.

³ "Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product." M.P.E.P. § 2113 (citing In re Marosi, 218 USPQ 289 (Fed. Cir. 1983)).

As with Akira, the Examiner has misconstrued Yoshihiko as teaching a hard mask that is resistant to heat. Feature 14/15, which is asserted by the Examiner to allegedly disclose the claimed hard mask, is taught by Yoshihiko to be a photoresist. As previously stated, the Examiner has not established that a photoresist does not identically disclose the claimed hard mask. As such, Yoshihiko fails to identically describe the claimed invention within the meaning of 35 U.S.C. § 102. Thus, Applicants respectfully request the withdrawal of the rejection of claims 1 and 5 under 35 U.S.C. § 102 for lack of novelty as evidenced by Yoshihiko.

Claims 1 and 5 are rejected under 35 U.S.C. § 102(e) for lack of novelty as evidenced by Schoenfeld et al., U.S. Patent No. 6,396,727 (hereinafter Schoenfeld)

In the third enumerated paragraph of the Office Action, the Examiner asserted that Schoenfeld discloses a semiconductor device corresponding to that claimed. This rejection is respectfully traversed.

As with Akira and Yoshihiko, the Examiner has identified no teaching in Schoenfeld of a hard mask that is resistant to heat. Feature 18, which is asserted by the Examiner to allegedly disclose the claimed hard mask, is referred to by Schoenfeld as a mask. As such, Schoenfeld fails to identically describe the claimed hard mask within the meaning of 35 U.S.C. § 102. Thus, Applicants respectfully request the withdrawal of the rejection of claims 1 and 5 under 35 U.S.C. § 102 for lack of novelty as evidenced by Yoshihiko.

Claims 1 and 3 are rejected under 35 U.S.C. § 102(b) for lack of novelty as evidenced by Doan et al., U.S. Patent No. 5,346,587 (hereinafter Doan)

In the fourth enumerated paragraph of the Office Action, the Examiner asserted that Doan discloses a semiconductor device corresponding to that claimed. This rejection is respectfully traversed.

In the Amendment filed October 29, 2002; Applicants argued that the silicide 35 of Doan does not identically disclose the claimed hard mask and that the gate electrode 34 of Doan does not identically disclose the claimed wiring. The Examiner responded in the thirteenth enumerated paragraph of the Office Action, with the following:

It is argued, at page 6 of the Remarks, that the gate electrode of Doan is not the wiring and the silicide is not the hard mask, as claimed. This argument is not convincing because the gate electrode of Doan is also the wiring and the silicide of Doan is used to etch the wiring. So the silicide is [sic] also function as the hard mask.

In response, Applicants incorporate herein the arguments previously presented with regard to the rejection of claims 1 and 5 under 35 U.S.C. § 102 as evidenced by Akira. Specifically, the Examiner is required to establish that the applied prior art is required to identically disclose each element of the claimed invention. The Examiner asserts that "the gate electrode of Doan is also the wiring;" however, this assertion ignores the well known fact that a gate electrode is considered to be part of a transistor, which is considered to be separate from the wiring of a circuit. As with the Examiner's prior argument that a photoresist discloses a hard mask, the Examiner's argument that a silicide discloses a hard mask because of an alleged shared function is not persuasive. The mere assertion that a disclosed element is capable of performing a function of the claimed element is not enough to establish that the disclosed element identically discloses the claimed element. Thus, significant differences exist between the semiconductor device defined in

independent claim 1 and the device of Doan. Therefore, Applicants respectfully solicit the withdrawal of the rejection of claims 1 and 3 under 35 U.S.C. § 102 as evidenced by Doan.

Claims 2-3 and 17 are rejected under 35 U.S.C. § 103 for obviousness predicated upon Akira in view of Tao et al., U.S. Patent No. 6,399,515 (hereinafter Tao)

In the fifth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Akira in view of Tao to arrive at the claimed invention. This rejection is respectfully traversed.

Claims 2-3 and 17 depend ultimately from independent claim 1, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. § 102 for lack of novelty as evidenced by Akira. Specifically, the photoresist of Akira does not disclose the claimed hard mask, and the Examiner's rejection of claims 2-3 and 17 is predicated upon Akira teaching a hard mask.

Applicants noted in the Amendment filed October 29, 2002, that the purported hard mask 38a, 38b of Tao is not used as an etch mask (see Figs. 5 and 6, and the accompanying description, which shows that photoresist 40a, 40b is used as an etch mask for the layer 36 below features 38a, 38b). The Examiner, however, continues to base his rejection on the assumption that features 38a, 38b act as an etch mask.

In addition, as argued in the Amendment filed October 29, 2002, the Examiner's asserted motivation to combine Akira in view of Tao is legally insufficient. The Examiner has merely stated

that it would have been obvious to replace the hard mask of Akira with Tao "because a silicon oxide film or a silicon nitride film is commonly used as the mask to etch the layer formed below it."

There mere fact alone that two elements allegedly share a common functionality is insufficient to establish a motivation to replace one element with the other. For example, all conductors or all insulators are not universally substitutable notwithstanding that such materials share certain common functions/capabilities.

In evaluating a material to be used in a semiconductor device, one having ordinary skill in the art evaluates how that material interacts with other materials around it and how the process used to form that material interacts with the other processes used to form the semiconductor device. As a result of this analysis, many potential materials are rejected because of compatibility issues. Such an analysis, however, has not been undertaken by the Examiner. There appears to have been no consideration made as to whether replacing the photoresist of Akira with the silicon nitride or silicon oxide film of Tao would be compatible with the structure of Akira. For example, silicon nitride or silicon oxide film are typically removed by etching whereas photoresist films are removed by thermal oxidation. These removal processes expose the semiconductor device to two very different conditions, and there is no guarantee that a process that uses a photoresist can instead also work satisfactorily with a hard mask. As such, Applicants respectfully submit that one having ordinary skill in the art would not have been motivated to modify Akira in view of Tao in the manner suggested by the Examiner. Applicants, therefore, respectfully submit that the imposed rejection of claims 2-3 and 17 under 35 U.S.C. § 103 for obviousness predicated upon Akira and Tao is not viable and, hence, solicit withdrawal thereof.

Claim 4 is rejected under 35 U.S.C. § 103 for obviousness predicated upon Akira in view of Williams, U.S. Patent No. 6,087,269

In the sixth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Akira in view of Williams to arrive at the claimed invention. This rejection is respectfully traversed.

As previously discussed, the photoresist of Akira does not disclose a hard mask, as claimed. Furthermore, the Examiner's rejection of claim 4 is predicated upon Akira teaching a hard mask. As such, the Examiner's rejection of claim 4 fails because the Examiner has not established a motivation to replace the photoresist of Akira with the hard mask of Williams.

Claims 2-3 and 17 are rejected under 35 U.S.C. § 103 for obviousness predicated upon Yoshihiko in view of Tao

In the seventh enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Yoshihiko in view of Tao to arrive at the claimed invention. This rejection is respectfully traversed.

Claims 2-3 and 17 depend ultimately from independent claim 1, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. § 102 for lack of novelty as evidenced by Yoshihiko. Specifically, the photoresist of Yoshihiko does not disclose the claimed hard mask. The Examiner's rejection of claims 2-3 and 17

is predicated upon Yoshihiko teaching a hard mask. As such, the Examiner's rejection of claims 2-3 and 17 fails because the Examiner has not established a motivation to replace the photoresist of Yoshihiko with the hard mask of Tao.

Claim 4 is rejected under 35 U.S.C. § 103 for obviousness predicated upon Yoshihiko in view of Williams

In the eighth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Yoshihiko in view of Williams to arrive at the claimed invention. This rejection is respectfully traversed.

As previously discussed, the photoresist of Yoshihiko does not disclose a hard mask, as claimed. Furthermore, the Examiner's rejection of claim 4 is predicated upon Yoshihiko teaching a hard mask. As such, the Examiner's rejection of claim 4 fails because the Examiner has not established a motivation to replace the photoresist of Yoshihiko with the hard mask of Williams.

Claims 2-3 and 17 are rejected under 35 U.S.C. § 103 for obviousness predicated upon Schoenfeld in view of Tao

In the ninth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Schoenfeld in view of Tao to arrive at the claimed invention. This rejection is respectfully traversed.

Claims 2-3 and 17 depend ultimately from independent claim 1, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. § 102 for lack of novelty as evidenced by Schoenfeld. Specifically, the mask of Schoenfeld does not disclose the claimed hard mask. The Examiner's rejection of claims 2-3 and 17 is predicated upon Schoenfeld teaching a hard mask. As such, the Examiner's rejection of claims 2-3 and 17 fails because the Examiner has not established a motivation to replace the mask of Schoenfeld with the hard mask of Tao.

Claim 4 is rejected under 35 U.S.C. § 103 for obviousness predicated upon Schoenfeld in view of Williams

In the tenth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Schoenfeld in view of Williams to arrive at the claimed invention. This rejection is respectfully traversed.

As previously discussed, the mask of Schoenfeld does not disclose a hard mask, as claimed. Furthermore, the Examiner's rejection of claim 4 is predicated upon Schoenfeld teaching a hard mask. As such, the Examiner's rejection of claim 4 fails because the Examiner has not established a motivation to replace the mask of Schoenfeld with the hard mask of Williams.

Claims 2 and 17 are rejected under 35 U.S.C. § 103 for obviousness predicated upon Doan in view of Tao

In the eleventh enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Doan in view of Tao to arrive at the claimed invention. This rejection is respectfully traversed.

Claims 2 and 17 depend ultimately from independent claim 1, and Applicants incorporate herein the arguments previously advanced in traversing the imposed rejection of claim 1 under 35 U.S.C. § 102 for lack of novelty as evidenced by Doan. Specifically, the silicide of Doan does not disclose the claimed hard mask. The Examiner's rejection of claims 2 and 17 is predicated upon Doan teaching a hard mask. As such, the Examiner's rejection of claims 2 and 17 fails because the Examiner has not established a motivation to replace the silicide of Doan with the hard mask of Tao.

Claim 4 is rejected under 35 U.S.C. § 103 for obviousness predicated upon Doan in view of Williams

In the twelfth enumerated paragraph of the Office Action, the Examiner concluded that one having ordinary skill in the art would have been motivated to modify the semiconductor device of Doan in view of Williams to arrive at the claimed invention. This rejection is respectfully traversed.

As previously discussed, the photoresist of Doan does not disclose a hard mask, as claimed. Furthermore, the Examiner's rejection of claim 4 is predicated upon Doan teaching a hard mask. As

such, the Examiner's rejection of claim 4 fails because the Examiner has not established a motivation to replace the silicide of Doan with the hard mask of Williams.

Applicants have made every effort to present claims which distinguish over the prior art, and it is believed that all claims are in condition for allowance. However, Applicants invite the Examiner to call the undersigned if it is believed that a telephonic interview would expedite the prosecution of the application to an allowance. Accordingly, and in view of the foregoing remarks, Applicants hereby respectfully request reconsideration and prompt allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417, and please credit any excess fees to such deposit account.

Respectfully submitted,

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